

REMARKS

The Office Action mailed on May 11, 2001, has been received and reviewed. Claims 1, 3-11, 13-44, 46, 48-64, 66-74, and 105-107 are currently pending in the application. Claims 1, 3-11, 13-44, 46, 48-64, 66-74, and 105-107 stand rejected. Reconsideration of the application is respectfully requested.

Rejections Under 35 U.S.C. § 103(a)

Isaka in View of Turner

Claims 105-107 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 5,482,598 to Isaka et al. (hereinafter "Isaka") in view of U.S. Patent 5,884,869 to Turner et al. (hereinafter "Turner").

It is respectfully submitted that, under 35 U.S.C. § 103(c), the rejection of claims 105-107 over the Isaka and Turner is improper. 35 U.S.C. § 103(c) provides:

Subject matter developed by another person, which qualifies as prior art only under one or more of subsections (e), (f), and (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person.

In the outstanding Office Action, at page 16, it has been indicated that any application having an effective filing date of November 29, 1999, a 35 U.S.C. § 103(a) rejection that is based on a commonly owned § 102(e) reference may be "overcome by showing that the subject matter of the reference and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person."

The above-referenced application, which is owned by Micron Technology, Inc., as indicated by the Assignment recorded by the Patent Office on October 23, 1998, at reel/frame: 9551/0837, has an effective filing date of April 19, 2000, the date on which the present Continued Prosecution Application (CPA) was filed. Under 35 U.S.C. § 120, it is entitled to priority based on the original October 23, 1998, filing date, the present CPA being a continuation of that application.

Turner, which was filed on September 14, 1995, but did not issue until March 23, 1999, only qualifies as prior art under 35 U.S.C. § 102(e) and indicates Micron Technology, Inc. to be the assignee thereof. Thus, under the provisions of 35 U.S.C. § 103(c), the Turner cannot be used in a 35 U.S.C. § 103(a) rejection of any of the claims of the above-referenced application.

Therefore, withdrawal of the 35 U.S.C. § 103(a) rejection of claims 105-107 as being unpatentable over the combination of Isaka and Turner is respectfully requested.

Isaka in View of Overton

Claims 1, 3-5, 7-11, 13, 16, 18-20, 25, 26, 29-32, 34, 35, 38, 39, 43, 46, 48-53, 56, 64, 66, 69-71, and 73 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Isaka in view of U.S. Patent 5,611,846 to Overton et al. (hereinafter "Overton").

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (Emphasis added).

Isaka discloses a chromatographic separation device that includes a silicon substrate and a only a single porous microchannel formed in the silicon substrate.

Overton discloses a miniaturized gas chromatograph that includes, among other things, a tubular column of conventional configuration. Overton discloses that the gas chromatograph may include multiple columns that are connected to one another by pneumatic valves. Apparently, a sample may be directed into a column appropriate for the type of analysis being performed by the disclosed apparatus.

Independent claim 1, as amended and presented herein, recites a sample separation apparatus that includes a substrate and matrices that are formed in the substrate and that comprise at least two *distinct, unconnected* porous regions that extend at least partially across the substrate. The sample separation apparatus of claim 1 also includes at least one detector fabricated on the substrate and associated with at least one of the at least two porous regions.

It is respectfully submitted that amended claim 1 is allowable under 35 U.S.C. § 103(a) for a number of reasons.

One of Ordinary Skill Would Not Have Been Motivated to Combine the Teachings of Isaka and Overton in the Asserted Manner

First, it is respectfully submitted that, before the priority for the above-referenced application, one of ordinary skill in the art would not have been motivated to combine the teachings of Isaka and Overton in the manner that has been suggested in the outstanding Office Action.

Specifically, Isaka teaches a chromatographic separation device that includes a porous column formed in a silicon substrate. Overton teaches a miniaturized chromatographic separation device that includes conventional columns, which typically comprise single-channeled tubular members. It is asserted at page 6 of the outstanding Office Action that the mere fact that the chromatograph of Overton is miniaturized would have provided the suggestion necessary to motivate one of ordinary skill in the art to modify the teachings of Isaka by those of Overton. This assertion ignores the significant differences between columns that are formed in a silicon substrate and conventional chromatography columns, including the fact that the multiple columns of Overton are connected by pneumatic valves, which could not be incorporated into the extremely small scale silicon substrate chromatograph of Isaka.

In view of the foregoing, it appears that any suggestion to one of ordinary skill in the art to combine the teachings of Isaka and Overton could only have been gleaned from the disclosure of the above-referenced patent application.

It is, therefore, respectfully submitted that one of ordinary skill in the art would not have been motivated to combine the teachings of Isaka and Overton.

There Is No Reasonable Expectation that the Suggested Combination Would Be Successful

Second, it is respectfully submitted that there is no reasonable expectation that the combination of Isaka and Overton would be successful.

M.P.E.P. § 2143.02 provides: “A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984).”

When considered in its entirety, the multi-column teaching of Overton includes a teaching that the columns are interconnected by way of pneumatic valves, which facilitate the selection of the column through which a sample will be conveyed. Accordingly, any modification of Isaka to include multiple columns, as described in Overton, must include interconnected columns, as well as the pneumatic valves of Overton. It is respectfully submitted that pneumatic valves could not be used to interconnect porous columns formed in a silicon substrate.

Accordingly, there is no reasonable expectation that the combination of Isaka and Overton would be successful.

The Proposed Combination Does Not Teach or Suggest Each and Every Claim Element

Third, it is respectfully submitted that Isaka and Overton, taken either alone or in combination, do not teach or suggest each and every element of any of claims 1, 3-5, 7-11, 13, 16, 18-20, 25, 26, 29-32, 34, 35, 38, 39, 43, 46, 48-53, 56, 64, 66, 69-71, or 73.

Independent claim 1, as amended and presented herein, recites a sample separation apparatus that comprises, among other things, a substrate, matrices formed in the substrate, the matrices forming at least two distinct, unconnected porous regions that extend at least partially

across the substrate, and at least one detector fabricated on the substrate in communication with at least one of the at least two porous regions.

By way of contrast with independent claim 1, the asserted combination of Isaka and Overton lacks any teaching or suggestion of two or more distinct, unconnected porous regions. Rather, Isaka teaches a chromatograph that includes a single porous column formed in a silicon substrate, while Overton teaches a chromatograph that includes interconnected conventional chromatography columns.

Further, neither Isaka nor Overton teaches or suggests a sample separation apparatus that includes at least one detector fabricated on the substrate and in communication with at least one porous region. To the contrary, the detector of the chromatograph of Isaka is separate from the substrate thereof, while the detector of the chromatograph of Overton, which lacks a substrate in which the columns thereof are formed, is separate from the conventional chromatography columns thereof.

Therefore, it is respectfully submitted that Isaka and Overton, taken either alone or in combination, do not teach or suggest each and every element of amended claim 1 and, thus, that amended claim 1 is allowable under 35 U.S.C. § 103(a).

Claims 3-5, 7-11, 13, 16, 18-20, 25, 26, and 29 are each allowable, among other reasons, as depending either directly or indirectly from claim 1, which is allowable.

Claim 5 is further allowable since neither Isaka nor Overton teaches or suggests a sample separation that includes at least two porous regions, at least one of which extends only partially across a substrate thereof. Again, the chromatograph of Isaka includes only one column. Overton does not teach or suggest that the columns thereof comprise porous regions in a substrate. Thus, there is no substrate for any of the columns of Overton to extend only partially across.

Claims 8 and 26 are each further allowable over Isaka and Overton since neither Isaka nor Overton, taken either alone or in combination, teaches or suggests an enzyme that is a capture component or capture substrate. Rather, as those of skill in the art are aware, an enzyme, such as

that disclosed in Isaka, only momentarily interacts with a substrate to react with a substrate in a manner that detectably alters the substrate. Thereafter, an enzyme of the type disclosed in Isaka releases the substrate, permitting the substrate to continue migrating through a microchannel. The altered substrate is then detected upon exiting the microchannel. By way of contrast, a capture component or capture substrate of the type recited in claims 8 and 26 reacts with an analyte by capturing the analyte, preventing further migration of the analyte, and need not substantially alter the analyte.

Claim 11, which depends from claims 1, 5, and 10, is additionally allowable since neither Isaka nor Overton, taken either alone or in combination, teaches or suggests a sample separation apparatus that includes reaction regions situated immediately along lengths of each of at least two porous regions thereof, which each reaction region being located substantially the same distance from an end of its respective column.

Claim 16, which recites that the sample separation apparatus include a processor on the substrate, is further allowable as neither Isaka nor Overton, taken either alone or in combination, teaches or suggests that a processor associated therewith could actually be located on a substrate in which at least two porous regions are formed. Isaka lacks any teaching or suggestion that it would be desirable to include a processor on the substrate of the device disclosed therein. Overton lacks any teaching that the conventional chromatography columns thereof could be formed in a substrate. Moreover, it is respectfully submitted that since no art has been cited that demonstrates that the inclusion (not necessarily fabrication) of a processor on the substrate itself would have been an obvious design choice, that the subject matter recited in claim 16 is not obvious—otherwise, it seems as though someone would have already made that design choice.

Independent claim 30, as amended and presented herein, recites a separation apparatus that includes a substrate, at least two distinct, unconnected capillary columns formed in the substrate, and a detector fabricated on the substrate and situated adjacent at least one of the capillary columns.

Again, neither Isaka nor Overton, taken either alone or in combination, teaches or suggests a separation apparatus that includes at least two distinct, unconnected capillary columns. Rather, Isaka teaches a chromatograph that includes a single porous column formed in a silicon substrate. While Overton teaches a miniaturized chromatograph that may include multiple columns, Overton teaches that these columns are connected by pneumatic valves. Thus, the multiple columns of Overton are not unconnected.

Moreover, neither Isaka nor Overton teaches or suggests a separation apparatus that includes a detector fabricated on a substrate thereof and situated adjacent at least one of the capillary columns. Rather, Isaka lacks any teaching or suggestion of a detector, while Overton lacks a substrate on which a detector could be fabricated.

As Isaka and Overton, taken either alone or in combination, do not teach or suggest each and every element of amended claim 30, it is respectfully submitted that amended claim 30 is allowable under 35 U.S.C. § 103(a).

Each of claims 31, 32, 34, 35, 38, 39, 43, 46, and 48-50 is allowable, among other reasons, as depending either directly or indirectly from claim 30, which is allowable.

In addition, claim 35 is allowable since the enzyme disclosed in Isaka is not a capture component or capture substrate. Rather, as those of skill in the art are aware, an enzyme, such as that disclosed in Isaka, only momentarily interacts with a substrate to react with a substrate in a manner that detectably alters the substrate. Thereafter, an enzyme of the type disclosed in Isaka releases the substrate, permitting the substrate to continue migrating through a microchannel. The altered substrate is then detected upon exiting the microchannel. By way of contrast, a capture component or capture substrate of the type recited in claim 35 reacts with an analyte by capturing the analyte, preventing further migration of the analyte, and need not substantially alter the analyte.

Claim 46 is further allowable since Overton does not teach or suggest that any two of the multiple columns thereof could have substantially equal lengths. Isaka, of course, does not include any teaching or suggestion of multiple columns.

Claim 48 is also allowable since Overton does not teach or suggest that any two of the multiple columns thereof could have substantially equal surface areas. Again, Isaka does not include any teaching or suggestion of multiple columns.

Claim 49 is additionally allowable since Overton does not teach or suggest that any two of the multiple columns thereof could have substantially equal volumes. To repeat: Isaka does not include any teaching or suggestion of multiple columns.

Independent claim 51, as amended and presented herein, recites a miniature chromatograph that includes a substrate and porous matrices formed in the substrate and comprising at least two distinct, unconnected capillary columns.

Isaka and Overton, taken either alone or in combination, lack any teaching or suggestion of a miniature chromatograph that includes at least two distinct, unconnected capillary columns. The teachings of Isaka are limited to a chromatograph with a single porous column formed in a silicon substrate, while Overton requires that multiple columns be connected to one another by way of pneumatic valves.

Because neither Isaka nor Overton, taken either alone or in combination, teaches or suggests each and every element of amended claim 51, it is respectfully submitted that amended claim 51 is allowable under 35 U.S.C. § 103(a).

Each of claims 52, 53, and 56 is allowable, among other reasons, as depending either directly or indirectly from claim 51, which is allowable.

Independent claim 64, as amended and presented herein, recites an analyte detection apparatus that includes a substrate comprising silicon. Matrices that are formed in the substrate comprise at least two distinct, unconnected porous columns that are continuous with a surface of the substrate.

Neither Isaka nor Overton, taken either alone or in combination, teaches or suggests an analyte detection apparatus that includes at least two distinct, unconnected porous columns. Rather, the chromatograph of Isaka includes a single column, while the multiple columns of the chromatograph of Overton are connected by way of pneumatic valves.

Claims 66, 69-71, and 73 are each allowable, among other reasons, as depending either directly or indirectly from claim 34, which is allowable.

Claim 66 is additionally allowable because neither Isaka nor Overton, taken either alone or in combination, teaches or suggests a capture substrate. As explained previously herein, those of skill in the art are aware that an enzyme such as that disclosed in Isaka only momentarily interacts with a substrate to react with a substrate in a manner that detectably alters the substrate. Thereafter, an enzyme of the type disclosed in Isaka releases the substrate, permitting the substrate to continue migrating through a microchannel. The altered substrate is then detected upon exiting the microchannel. By way of contrast, a capture component or capture substrate of the type recited in claim 66 reacts with an analyte by capturing the analyte, preventing further migration of the analyte, and need not substantially alter the analyte.

In view of the foregoing, it is respectfully requested that the 35 U.S.C. § 103(a) rejections of claims 1, 3-5, 7-11, 13, 16, 18-20, 25, 26, 29-32, 34, 35, 38, 39, 43, 46, 48-53, 56, 64, 66, 69-71, and 73 be withdrawn.

Isaka in View of Overton and Further in View of Miura

Claims 14, 15, 17, 21, 40, 41, 44, 54, and 55 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Isaka in view of Overton et al., as applied to claims 1, 3-5, 7-11, 13, 16, 18-20, 25, 26, 29-32, 34, 35, 38, 39, 43, 46, 48-53, 56, 64, 66, 69-71, and 73 above, and further in view of U.S. Patent 5,132,012 to Miura et al. (hereinafter “Miura”).

The teachings of Isaka and Overton were summarized previously herein.

Miura teaches, among other things, a small-scale liquid chromatograph including a silicon substrate, a single, coiled column formed in the substrate, and a detector, such as a field effect transistor, formed on the substrate, adjacent the column.

Miura does not include any teachings that provide the motivation that is lacking from Isaka, Overton, and the knowledge that was generally available in the art before the priority date of the referenced application to combine the teachings of Isaka and Overton or to provide a reasonable expectation that the asserted combination of Isaka and Overton would be successful.

Accordingly, it is respectfully submitted that one of ordinary skill in the art would not have been motivated to combine the teachings of Isaka, Overton, and Miura in the manner that has been asserted in the outstanding Office Action. In addition, it is respectfully submitted that, even if the ordinarily skilled artisan would have been motivated to combine the teachings of Isaka, Overton, and Miura, as has been asserted, there is no reasonable expectation that such a combination would have been successful.

Claims 14, 15, 17, and 21 are each allowable, among other reasons, as depending either directly or indirectly from claim 1, which is allowable.

Claim 17, which depends directly from claim 1, is additionally allowable since Isaka, Overton, and Miura each lack any teaching or suggestion of a memory device on a substrate of the chromatographs taught thereby. The mere fact that Miura does not teach or suggest that a memory device could be located on a substrate does not amount to a teaching or suggestion that a memory device may, in fact, be located on a substrate of a sample separation apparatus. If the inclusion of a memory device on the substrate of a sample separation apparatus would have been an obvious design choice, as asserted in the outstanding Office Action, the Office is respectfully invited to cite a reference that discloses a sample separation apparatus of the type recited in claim 17 with a memory device on the substrate thereof.

Claim 21 is additionally allowable since Isaka, Overton, and Miura, taken either singly or in combination, fail to teach or suggest a vacuum source in operative communication with a porous region. Rather, it appears that Miura only teaches or suggests the use of positive pressure to facilitate the movement of a sample through the column thereof. *See, e.g.*, Miura, col. 10, lines 1-34.

Claims 40, 41, and 44 are each allowable, among other reasons, as depending either directly or indirectly from claim 30, which is allowable.

Claim 41 is also allowable since Isaka, Overton, and Miura, taken either singly or in combination, fail to teach or suggest a vacuum source in operative communication with a porous region. Rather, it appears that Miura only teaches or suggests the use of positive pressure to

facilitate the movement of a sample through the column thereof. *See, e.g.,* Miura, col. 10, lines 1-34.

In addition, claim 44 is allowable since none of Isaka, Overton, and Miura teaches or suggests a sample separation apparatus that includes a memory device on a substrate thereof. The mere fact that Miura does not teach or suggest that a memory device could be located on a substrate does not amount to a teaching or suggestion that a memory device may, in fact, be located on a substrate of a sample separation apparatus.

Claims 54 and 55 are each allowable, among other reasons, as depending from claim 52, which is allowable.

In light of the foregoing reasons, it is respectfully requested that the Office withdraw the 35 U.S.C. § 103(a) rejections of claims 14, 15, 17, 21, 40, 41, 44, 54, and 55 as being rendered obvious by the combination of Isaka, Overton, and Miura.

Isaka in View of Overton and Further in View of Wang

Claims 21 and 41 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Isaka in view of Overton, as applied to claims 1, 3-5, 7-11, 13, 16, 18-20, 25, 26, 29-32, 34, 35, 38, 39, 43, 46, 48-53, 56, 64, 66, 69-71, and 73 above, and further in view of U.S. Patent 5,663,488 to Wang et al. (hereinafter “Wang”).

The teachings of Isaka and Overton are discussed previously herein.

Wang teaches a thermal isolation system that includes, among other things, a chamber within which temperature and pressure may be controlled. A separation device, such as a miniature chromatographic column, may be disposed within the chamber.

It is respectfully submitted that Wang does not include any teachings that provide the motivation that is lacking from Isaka, Overton, and the knowledge that was generally available in the art before the priority date of the referenced application to combine the teachings of Isaka and Overton or to provide a reasonable expectation that the asserted combination of Isaka and Overton would be successful. Accordingly, it is respectfully submitted that one of ordinary skill

in the art would not have been motivated to combine the teachings of Isaka, Overton, and Wang in the manner that has been asserted in the outstanding Office Action. In addition, it is respectfully submitted that, even if the ordinarily skilled artisan would have been motivated to combine the teachings of Isaka, Overton, and Wang, as has been asserted, there is no reasonable expectation that such a combination would have been successful.

Claim 21 is allowable, among other reasons, as depending from claim 1, which is allowable. Claim 21 is further allowable since none of Isaka, Overton, and Wang, taken either singly or in combination, teaches or suggests a vacuum source operatively in communication with an end of the chromatography column thereof. Rather, the vacuum of Wang, which is discussed, for example, at col. 1, line 63, to col. 2, line 4, and col. 2, lines 29-41, thereof, is used to vary the pressure within the chamber and would, therefore, be applied evenly across an entire column positioned within the chamber.

Claim 41 is allowable as depending from claim 30, which is allowable, and further because Isaka, Overton, and Wang, taken either alone or in combination, fail to teach or suggest a vacuum source operatively in communication with an end of a chromatography column.

For the foregoing reasons, it is respectfully requested that the Office withdraw the 35 U.S.C. § 103(a) rejections of claims 21 and 41 as being unpatentable in view of the teachings of Isaka, Overton, and Wang.

Isaka in View of Overton and Further in View of Turner

Claims 33 and 74 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Isaka in view of Overton, as applied to claims 1, 3-5, 7-11, 13, 16, 18-20, 25, 26, 29-32, 34, 35, 38, 39, 43, 46, 48-53, 56, 64, 66, 69-71, and 73 above, and further in view of Turner.

First, because Turner qualifies as prior art only under 35 U.S.C. § 102(e) and is owned by the assignee of the above-referenced application, it is respectfully submitted that it is improper to base any 35 U.S.C. § 103(a) rejection of any of the claims of the above-referenced application on Turner.

Second, it is respectfully submitted that claim 33 is allowable, among other reasons, as depending from claim 30, which is allowable, while claim 74 is allowable, among other reasons, as depending from claim 64, which is allowable.

Third, it is respectfully submitted that Turner is devoid of any teachings or suggestions that would remedy the deficiencies of Isaka, Turner, and the knowledge that was generally available before the priority date of the referenced application with respect to motivating one of ordinary skill in the art to combine the teachings of Isaka and Overton. Thus, motivation is also lacking for one of ordinary skill in the art to have combined the teachings of Isaka, Overton, and Turner in the manner that has been asserted in the outstanding Office Action.

Fourth, even if such motivation could be found in the references themselves or in the knowledge that was generally available in the art, when the references are considered in their entirety, there is no reasonable expectation that the asserted combination would be successful. In particular, it is not understood how the pneumatic valves of Overton could be incorporated into the porous regions of Isaka.

For these reasons, it is respectfully requested that the Office withdraw the rejections of claims 33 and 74 under 35 U.S.C. § 103(a).

Isaka in View of Overton and Further in View of Northrup

Claims 22-24 and 42 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Isaka in view of Overton, as applied to claims 1, 3-5, 7-11, 13, 16, 18-20, 25, 26, 29-32, 34, 35, 38, 39, 43, 46, 48-53, 56, 64, 66, 69-71, and 73 above, and further in view of U.S. Patent 5,882,496 to Northrup et al. (hereinafter "Northrup").

Northrup discloses, among several other things, a electrophoretic separation device that includes porous columns formed internally within a silicon substrate. Electrodes are positioned at opposite ends of the substrate so as to facilitate the movement of the constituents of a sample along the lengths of the columns. Northrup also discloses methods for fabricating such an electrophoretic separation device.

Claims 22-24 are each allowable, among other reasons, as depending from claim 1, which is allowable.

Claim 42 is allowable, among other reasons, as depending from claim 30, which is allowable.

Moreover, it is respectfully submitted that Northrup does not include any teachings or suggestions that would remedy the deficiencies of Isaka, Overton, and the knowledge generally available in the art before the priority date for the referenced application with respect to motivating one of ordinary skill in the art to make the proposed combination. Thus, one of ordinary skill in the art would not have been motivated to combine the teachings of Isaka, Overton, and Northrup.

Further, for the same reasons provided previously herein with respect to the asserted combination of Isaka and Overton, it is respectfully submitted that there is no reasonable expectation that the asserted combination of Isaka, Overton, and Northrup would be successful.

Therefore, withdrawal of the 35 U.S.C. § 103(a) rejections of claims 22-24 and 42 is respectfully requested.

Isaka in View of Overton and Further in View of Swedberg

Claims 27, 28, 36, 37, 67, and 68 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Isaka in view of Overton, as applied to claims 1, 3-5, 7-11, 13, 16, 18-20, 25, 26, 29-32, 34, 35, 38, 39, 43, 46, 48-53, 56, 64, 66, 69-71, and 73 above, and further in view of U.S. Patent 5,571,410 to Swedberg et al. (hereinafter "Swedberg").

Swedberg teaches a miniaturized separation apparatus including a column within which a porous quantity of biocompatible material, such as "nylon, cellulose, polymethylmethacrylate, polyacrylamide, agarose, or the like", may be disposed. Col. 27, lines 37-40. Each of these materials have long been used in separating the constituents of biological samples. Swedberg does not teach that the porous matrix is formed in the substrate. Rather, a quantity of biocompatible, porous material is placed into an open column.

Claims 27 and 28 are allowable, among other reasons, as depending from claim 1, which is allowable.

Both of claims 36 and 37 are allowable, among other reasons, as depending from claim 30, which is allowable.

Claims 67 and 68 are both allowable, among other reasons, as depending from claim 64, which is allowable.

Further, it is respectfully submitted that each of claims 27, 28, 36, 37, 67, and 68 is allowable under 35 U.S.C. § 103(a) since one of ordinary skill in the art would not have been motivated to combine the teachings of Isaka, Overton, and Swedberg in the manner that has been suggested and since there would have been no reasonable expectation that the asserted combination of Isaka, Overton, and Swedberg would have been successful.

More specifically, it is respectfully submitted that Swedberg does not include any teaching or suggestion that would have motivated one of ordinary skill in the art to modify the porous silicon column of Isaka with the teachings of Overton relating to conventional chromatography columns. Further, there is no teaching in Swedberg that would make it possible to use pneumatic valves to connect porous silicon columns of the type described in Isaka.

In view of the foregoing, it is respectfully requested that the Office withdraw the 35 U.S.C. § 103(a) rejection of claims 27, 28, 36, 37, 67, and 68.

Isaka in View of Overton and, if Necessary, Northrup in View of Turner and
Further in View of Sunzeri

Claims 6, 57-63, and 72 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Isaka in view of Overton, as applied to claims 1, 3-5, 7-11, 13, 16, 18-20, 25, 26, 29-32, 34, 35, 38, 39, 43, 46, 48-53, 56, 64, 66, 69-71, and 73 above, and, if necessary, Northrup in view of Turner and in further view of U.S. Patent 5,536,382 to Sunzeri (hereinafter "Sunzeri").

It is respectfully submitted that the optional reliance of Northrup in view of Turner in this rejection is improper under 35 U.S.C. § 103(c) for the reasons previously provided herein.

Sunzeri teaches a method for analyzing the constituents of human biological fluids. A labeled specific binding pair member is added to a human biological fluid to effect binding between an analyte in the human biological fluid and the specific binding pair member. The constituents of the human biological fluid, including complexes of the analyte and the specific binding pair member, are separated by way of known capillary electrophoresis techniques. The separation obtained by way of capillary electrophoresis is then compared to a control, which provides a standard for quantitation by indicating the position where the analyte would have been present if it had not been bound by the labeled specific binding pair member. The specific binding pair member is not immobilized to the matrix of the capillary electrophoresis substrate, but rather is permitted to travel therethrough with the bound analyte.

Claim 6 is allowable as depending from claim 1, which is allowable, and further for the reasons provided herein with respect to claim 57.

Independent claim 57 recites an electrophoretic apparatus that includes a substrate, at least one sample column formed in the substrate and including a first porous matrix, and a control column comprising a second porous matrix also formed in the substrate.

It is respectfully submitted that independent claim 57 is allowable over the combination of Isaka with Overton and Sunzeri for two reasons: first, one of ordinary skill in the art would not have been motivated to combine the teachings of Isaka, Overton, and Sunzeri in the asserted manner; second, assuming such a combination could have been made, there would have been no reason to expect such a combination to be successful.

With respect to the lack of motivation to one of ordinary skill in the art to combine the teachings of Isaka, Overton, and Sunzeri, it is respectfully submitted that one of ordinary skill in the art would not have been motivated to combine Isaka and Overton for the reasons provided previously herein: Isaka describes porous columns formed in a substrate while Overton teaches an apparatus that includes conventional, open channeled chromatography columns, which are free-standing and, thus, are not formed in a substrate. Sunzeri does not include any teachings or

suggestions that remedy the motivation lacking from Isaka, Overton, and the knowledge that was generally available in the art before the priority date for the referenced application.

Additionally, it is submitted that one of ordinary skill in the art would not have been motivated to use a control column, such as that described in Sunzeri, in the chromatography apparatus of either Isaka or Overton. Insofar as Applicant is aware, chromatography apparatus do not include control columns as control columns would not provide any useful information due to the manner in which the constituents of a sample are separated by such columns, exiting such columns separately from one another for subsequent, separate identification.

It is further submitted that Sunzeri does not include any teaching or suggestion that would provide one of ordinary skill in the art with a reasonable expectation that the pneumatic valves of the chromatograph described in Overton could be used to connect porous silicon columns of the type described in Isaka.

Therefore, it is respectfully submitted that independent claim 57 is allowable over the combination of Isaka, Overton, and Sunzeri.

Claims 58-63 are each allowable, among other reasons, as depending from claim 57, which is allowable.

Claim 72 is allowable, among the other reasons provided herein, as depending from claim 64, which is allowable.

CONCLUSION

Claims 1, 3-11, 13-44, 46, 48-64, 66-74, and 105-107 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should it be determined that additional issues remain which might be resolved by way of a telephone conference, the Office is respectfully invited to contact Applicant's undersigned attorney.

Respectfully Submitted,



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Enclosure: Version With Markings to Show Changes Made

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Serial No. 09/177,814

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

1. (Amended five times) A sample separation apparatus, comprising:
a substrate comprising at least one of silicon, gallium arsenide, and indium phosphide;
matrices formed in said substrate, said matrices comprising at least two distinct, unconnected
porous regions, each of said at least two porous regions extending at least partially across
said substrate; and
at least one detector fabricated on said substrate in communication with at least one of said at
least two porous regions.

30. (Amended four times) A separation apparatus, comprising:
a substrate;
at least two distinct, unconnected capillary columns formed in said substrate, each of said at least
two capillary columns comprising a porous matrix; and
a detector fabricated on said substrate and situated adjacent at least one of said at least two
capillary columns.

51. (Amended four times) A miniature chromatograph, comprising:
a substrate;
porous matrices formed in said substrate and comprising at least two distinct, unconnected
capillary columns, said porous matrices each comprising a plurality of pores.

64. (Amended four times) An analyte detection apparatus, comprising:
a substrate comprising silicon; and

matrices formed in said substrate, said matrices comprising at least two distinct, unconnected porous columns continuous with a surface of said substrate.